NASA Technology Inventory Database System
(1999 Data Input Introduction)

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NASA Technology Inventory Database

- Documented nearly $2 billion of NASA technology investments in FY 98
- Used to support Technology Leadership Council recommendations to the Capital Investment Council
- Inventory Objectives:
  - Accounting of agency-wide investment in technology
  - Linkage between technology tasks and Enterprise challenges/needs
  - Distribution of technology resources across:
    - Technology time-frames (short-term vs. long-term)
    - Cross-Enterprise Technology Development
    - Contract/Grant/Partnership/Cooperative agreement
  - Information on specific areas, activities, or programs

Technology Definition

- Within the context of the NASA Technology Plan, technology is defined as the practical application of knowledge to increase the capability to do something entirely new or in an entirely new way. This can be contrasted to scientific research which encompasses the discovery of new knowledge, from which new technology is derived, and engineering which uses technology derived from this knowledge to solve specific technical problems.
- Technology may be described in terms of maturity within a scale of Technology Readiness Level (TRL) that reflects the extent to which the technology has been proven in a realistic situation.
  - Examples of TRL are being collected to assist in assigning values
  - Examples will be documented for various disciplines (power, communications, detectors, software, etc.)

What Information We Want to Collect

- What is the nature of the work that's going on?
- Who is doing it and where are they?
- Who is paying for it, who can use it and how does it relate to NASA goals?
- How can people locate the work (keywords)?
- How mature is it?
- How much is NASA investing in it and what are our plans?
- Who is working with us and how much are they investing?

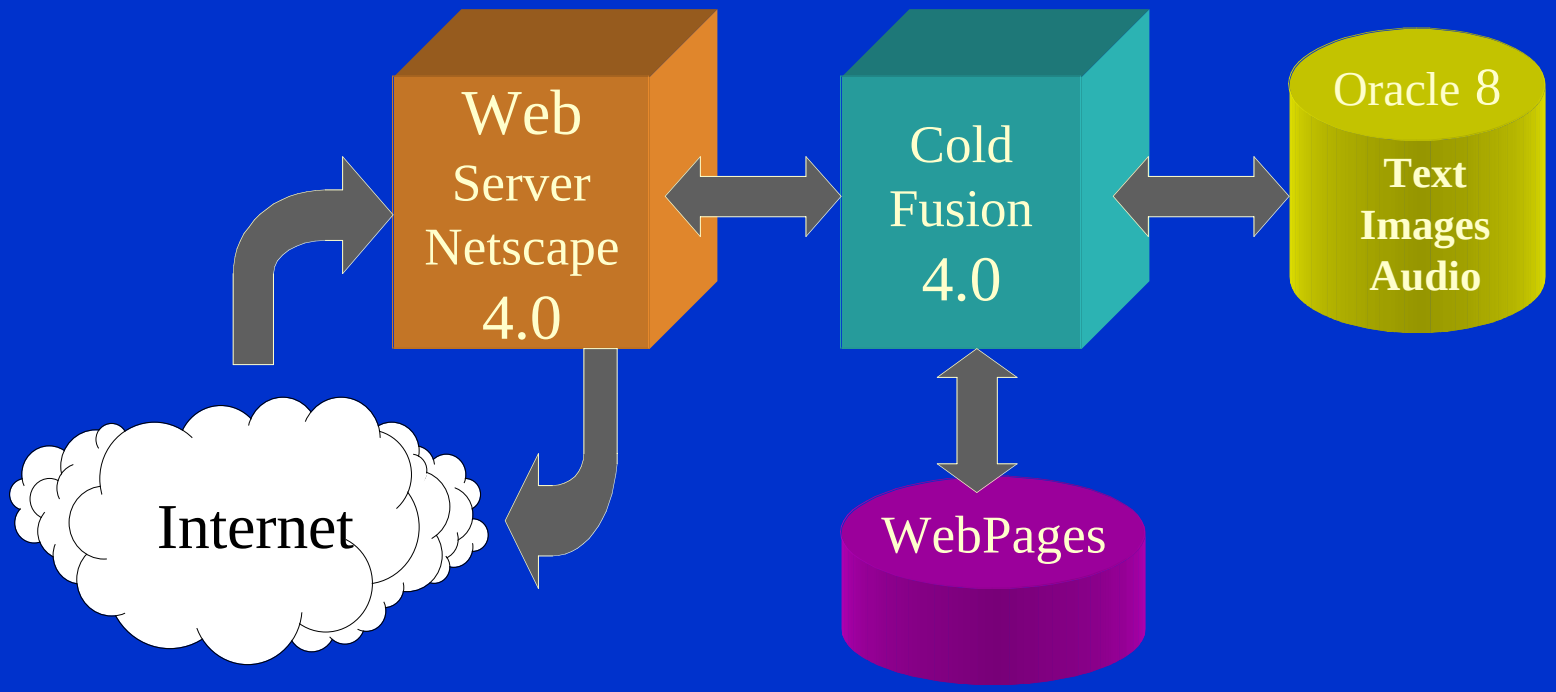
Technology Inventory Information Content

- Title and Description of the Technology Activity (incl. SOA, milestones)
- Technical Point of Contact Information (name, center, phone, e-mail)
- Beneficiaries & Relevance (funding Enterprise, benefiting Enterprises, linkage to Enterprise mission areas, challenges, concepts, etc.)
- Categories & Keywords (strategic tech area, discipline area, Enterprise-specific areas)
- Technology Maturity (TRL identifies maturity, indicates near-mid-far content)
- Resources and Implementation (funding and civil servant profile for 3 years, budget breakdown into contract, grant, in-house and partnership categories)
- Partnerships (NASA contributions, other contributions)

FY99 Technology Inventory Input Overview

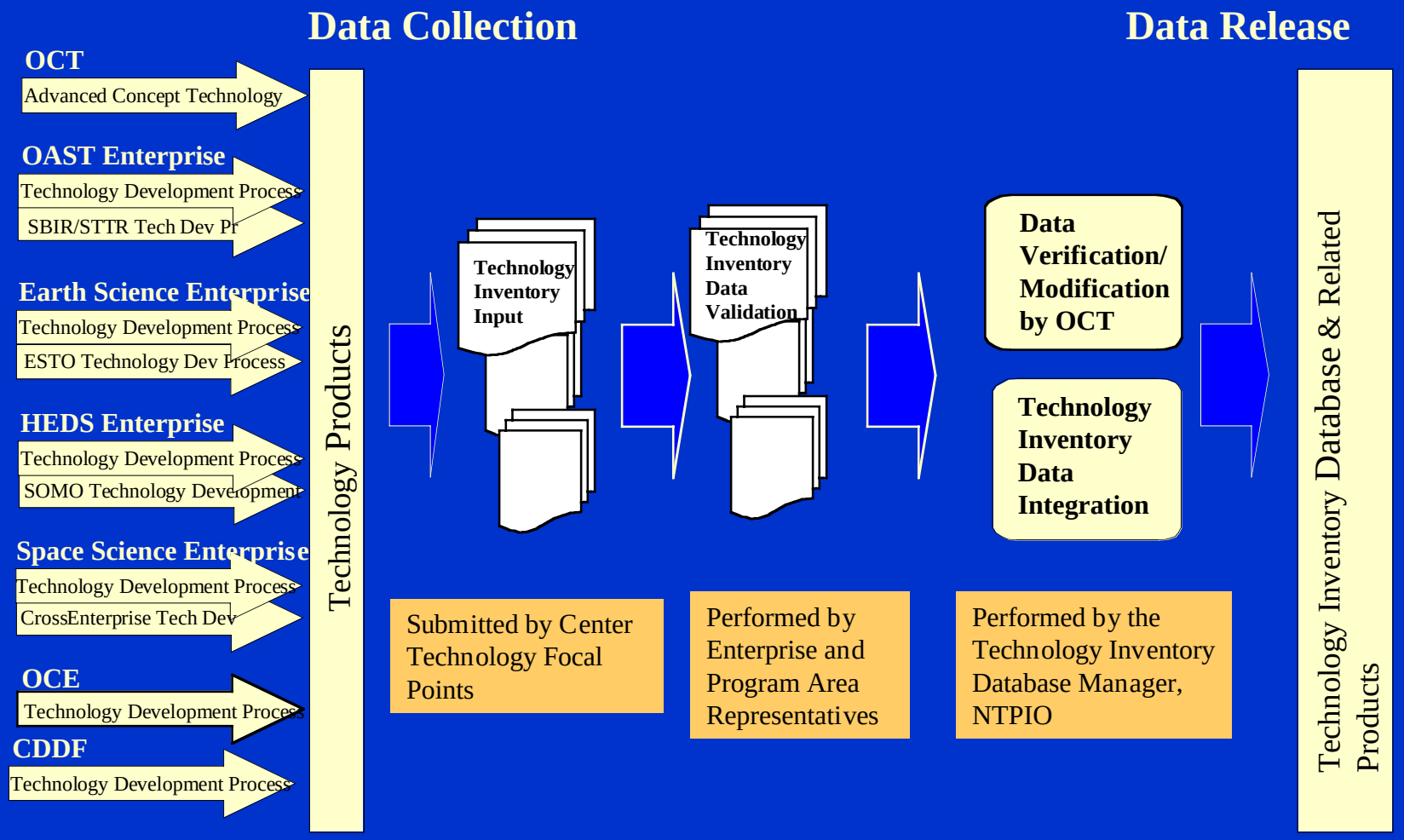
- 1998 data as basis for the 1999 input.
- Data will be submitted by field centers or automatically transferred from other databases (e.g. SBIR database, Cross Enterprise Technology Development Program planning tool).
  - Four levels of configuration change control & data verification.
    - Level 1 - Users in the field centers.
    - Level 2 - Center focal points.
    - Level 3 - Enterprise representatives.
    - Level 4 - OCT Office & Inventory database manager.
- The new web-based Oracle system will be used to collect FY99 input:
  - Allows users to submit data on the web.
  - Enforces insert, update, & delete privileges based on user groups/user ids.
  - Implements four levels of configuration change control.
- System Access
  - http://ntidb1.gsfc.nasa.gov/Inventory99/

FY99 Technology Inventory System Diagram

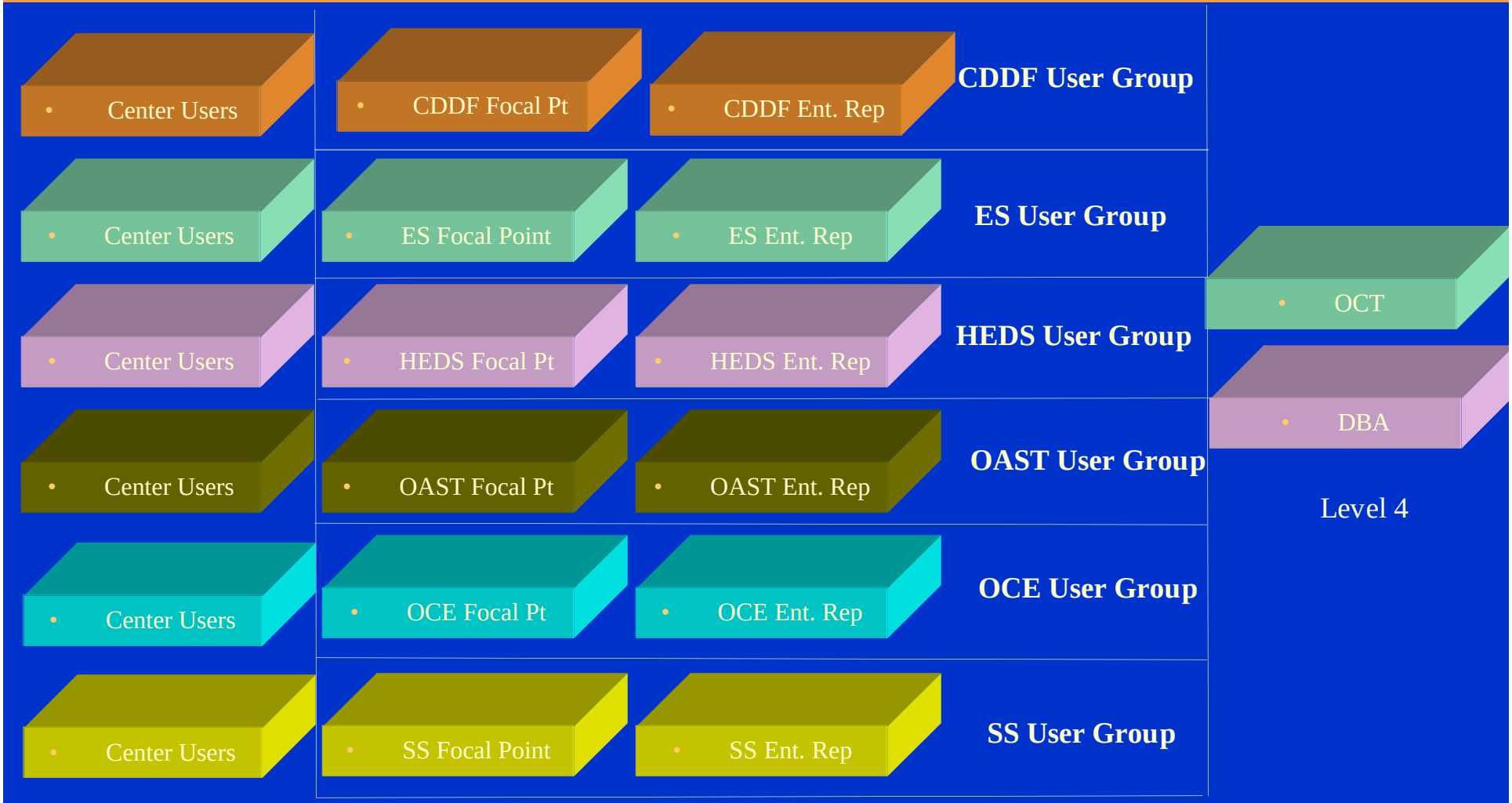


- **System descriptions**
  - **Hardware & Software: NT server, Netscape as the net browser, Oracle as the back end database engine, and Cold Fusion as the rapid application development tool to create dynamic Web applications and interactive Web sites.**
  - **Security: enforces security on multiple levels (network, net browser, database).**

NASA Technology Inventory Input Process Flow



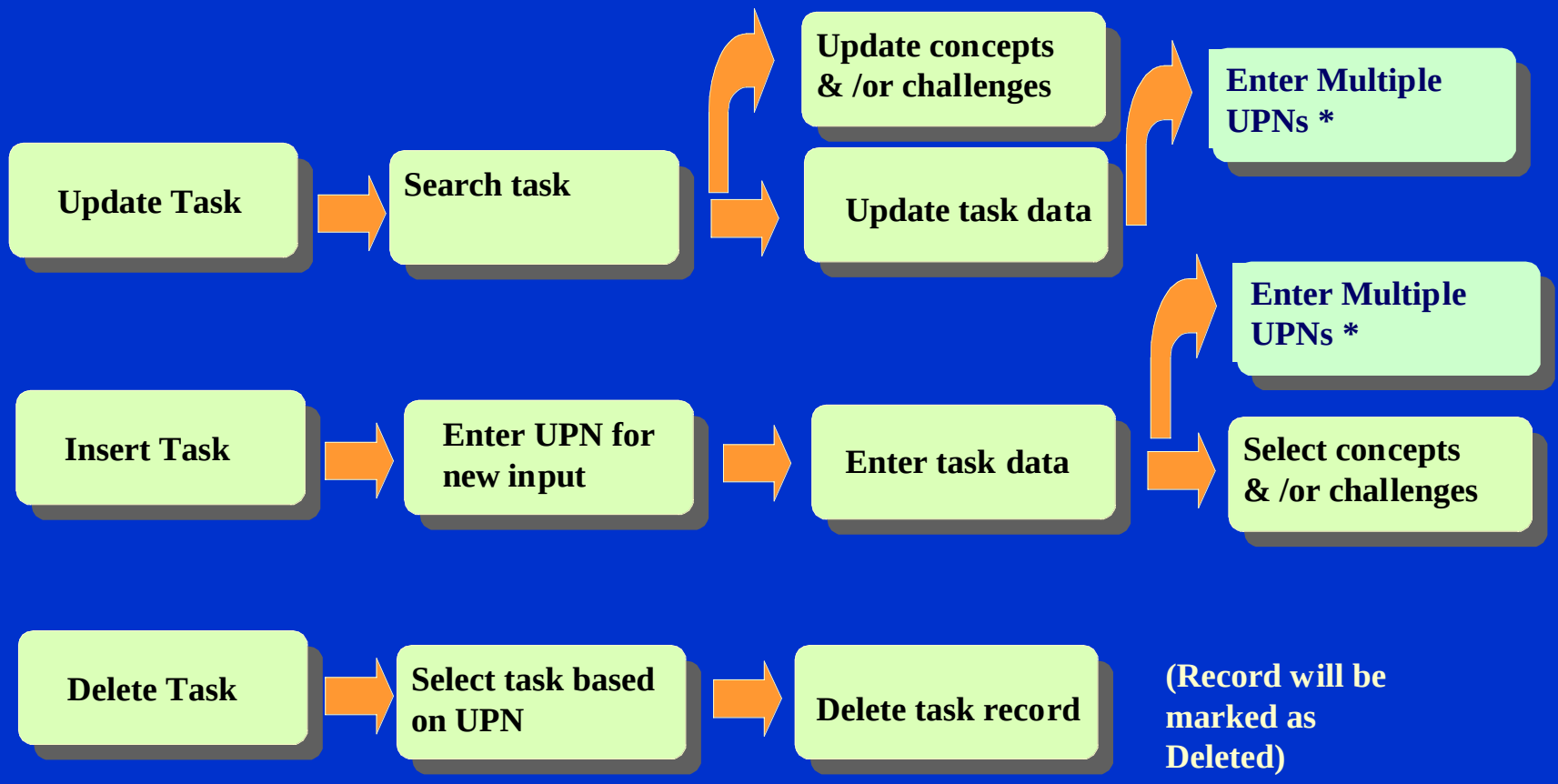
User Groups


Center Users
CDDF Focal Pt
CDDF Ent. Rep
CDDF User Group
Center Users
ES Focal Point
ES Ent. Rep
ES User Group
Center Users
HEDS Focal Pt
HEDS Ent. Rep
HEDS User Group
Center Users
OAST Focal Pt
OAST Ent. Rep
OAST User Group
Center Users
OCE Focal Pt
OCE Ent. Rep
OCE User Group
Center Users
SS Focal Point
SS Ent. Rep
SS User Group
OCT
DBA
Level 4
Level 1
Level 2
Level 3

User Accounts

- User accounts
  - Level 1 - Each NASA center has one generic account that can insert, update, and delete ALL records.
  - Level 2 - Each focal point within each Enterprise has his/her account to review his/her Enterprise records sent by Level 1 users. He/she can also insert, update, and delete Level 2 Enterprise records.
  - Level 3 - Each Enterprise representative/deputy has his/her account to review his/her Enterprise records sent by Level 2 focal points. He/she can also insert, update, and delete Level 3 Enterprise records.
  - Level 4 - OCT and database manager has his/her account to review records sent by Level 3 Enterprise representatives. He/she can also insert, update, and delete Level 4 records.
- Security will be implemented:
  - by network domain access (.nasa.gov)
  - by user group and user id on the web server and in the database.

Insert/Update/Delete Records



* - Optional

Configuration Change Control

- Each task record will relate to a configuration change control level (1 through 4).
  - Level 1- NASA center users
  - Level 2- Center focal points
  - Level 3- Enterprise representatives
  - Level 4- OCT & Inventory database manager
- The configuration control level will be automatically changed by the software when data is transferred to the next level.
- Once the level is changed, the previous owner (from the lower level) cannot update the data.
- Data can be re-set to a lower level by current level personnel in order to enable updates by a lower level user.
- The higher level user can see lower level data, but will not able to change the data until the data arrives at their level.

Configuration Change Control Scenario

Task Record	CCC Level
Record 1	
Record 2	
Record 3	

- Configuration Change Control (CCC) Level
  - 1- Center Users
  - 2- Focal Points
  - 3- Enterprise Representatives
  - 4- OCT & DBA

Center Users

Task Record	CCC Level
Record 1	1
Record 2	1
Record 3	1

Electronic Submission

Focal Points

Task Record	CCC Level
Record 1	2
Record 2	2
Record 3	2

Electronic Submission

Enterprise Reps.

Task Record	CCC Level
Record 1	3
Record 2	3
Record 3	3

Electronic Submission

OCT & DBA

Task Record	CCC Level
Record 1	4
Record 2	4
Record 3	4

Record Status

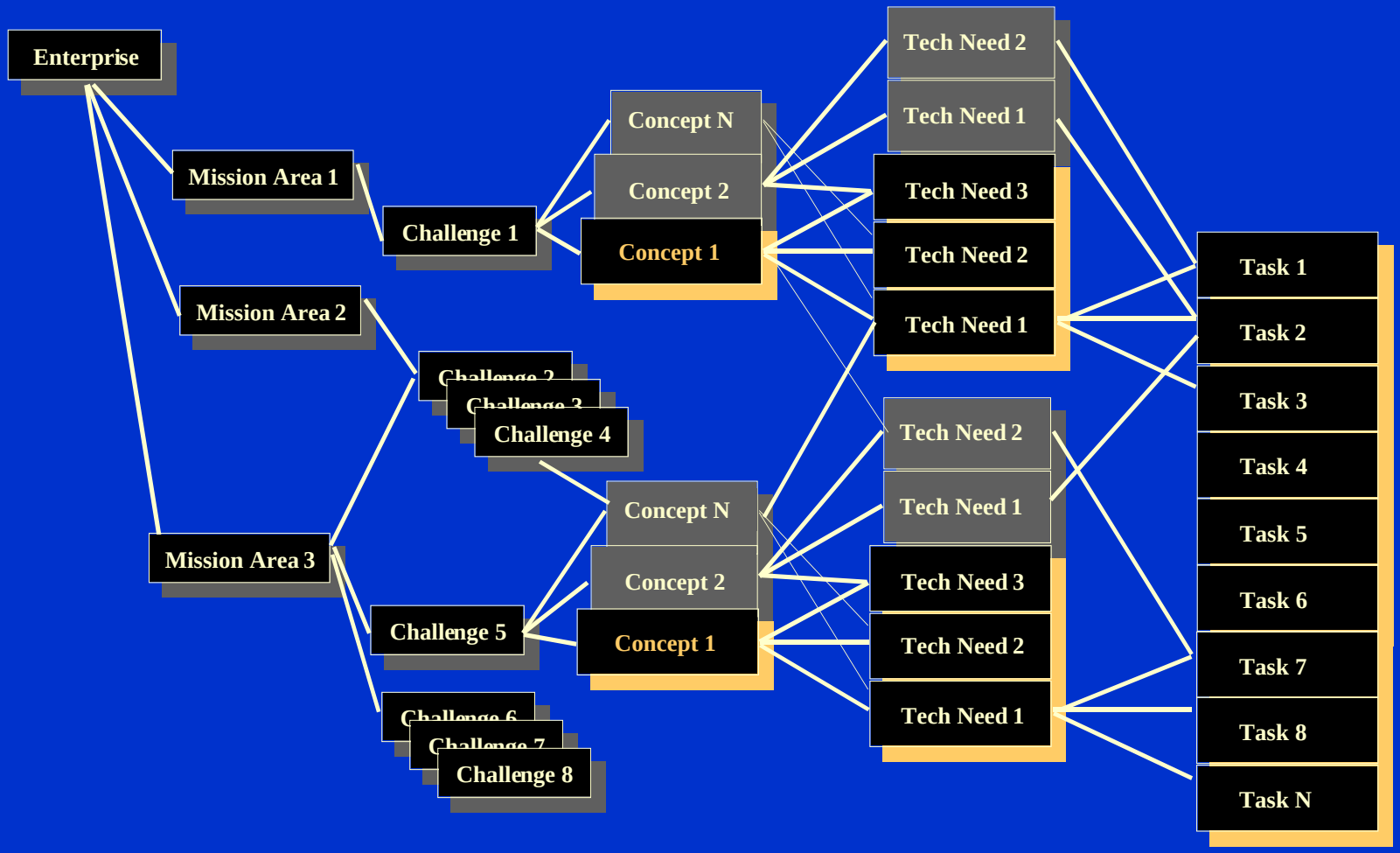
Task Record	Record Status
Record 1	
Record 2	
Record 3	

- Record Status (RS)
  - U- Update (generates by System)
  - D- Delete

- Initially the record status for each task is blank. After user updates a task, the record status of the task is set to ‘U’.
- When user deletes a record, it will be marked as ‘D’ in record status
- After the record is transferred to a higher level, this field will be set to blank again.

Backup Charts

NASA Enterprise Technology Planning



Definitions

- Enterprise
  - one of the four Strategic Enterprises described in the NASA Strategic Plan
- Mission Area
  - a set of fundamental scientific themes/questions derived from NASA and the Enterprise Strategic Plans
- Challenge
  - the translation of the scientific themes/questions into corresponding quantified technology goals
- Concept
  - a proposed approach to satisfying a challenge
- Technology Need (Not currently populated)
  - describes where existing technology capabilities are not sufficient to support concept
- Technology Task/Project
  - describes the effort to satisfy a technology need in terms of objective, goal, approach, milestones, products, resources, technology maturity level, etc.

Example of Traceability (ES)

NASA Technology Inventory — **Friday, February 12, 1999**

- 2.Enterprise-Earth Science::
  - 22.Mission Area- Interannual Climate ::
    - 207.Challenge-Monitor precipitation on global scale: Mesoscale rain events -- Hor resolution 1 km; temporal sampling 1 hr; accuracy + 10%. Snow extent/H20 equivalent -- Hor resolution 0.5-1.0 km; temporal sampling 1-3 days; accuracy 1 cm H20/10 cm snow. (Long term objective is to provide spacebased capability at low cost and with 7-yr lifetimes and stable calibration. Possible snowfall measurement concepts include uwave emissions and reflectivity. Issues: cloud obscurration, snow under trees.)
  - 23.Mission Area- Long-term Climate ::
    - 216.Challenge-Provide global cloud profiles/properties including particle density and size, ice and H2O content, and optical depth: HOR res 1-10 km; temporal res 1/day; vert resolution 500 m; accuracies -- optical depth 0.1, ice water path 1 gm/m2.

- 2009.Concept-In-space cloud and rain radar
  - 46 Task-A Lab. Study of the Interaction of Charged Particles with Electron Beams and Ultraviolet Rad. [Show Task]
  - 282 Task-ER-2 Doppler Radar [Show Task]
  - 1077 Task-Cold Temperature Electromagnetic Actuators [Show Task]
  - 1083 Task-Off-Beam Lidar Probing of Stratifom Clouds: A Laboratory Simulation [Show Task]
  - 1096 Task-A Superfluid Helium Film Heat Switch/Heat Pipe [Show Task]

[Technology Map]|| [Browse Task] ||[Search]

Example of Traceability (HEDS)

NASA Technology Inventory — **Tuesday, April 13, 1999**

- 3.Enterprise-Human Exploration And Development of Space::
  - 30.Mission Area- Prepare to conduct human missions of exploration. ::
  - 32.Mission Area- Continue to open and develop the space frontier ::
    - 300.Challenge-Develop scenarios, concepts and technological approaches that achieve at least an order of magnitude reduction in the costs of non-transportation systems for the human exploration beyond Earth orbit, compared to 1990 projections.
  - 32.Mission Area- Continue to open and develop the space frontier ::
  - 33.Mission Area- Aggressively seek investment from the private sector ::
    - 310.Challenge-Increase the value of HEDS programs, to more people, in the areas of knowledge, space commerce, human experience, education, and technology.

- 3019.Concept-Large, low-mass space structures, including structures fabricated in space (e.g., foamed structures)
  - 321 Task-New In-space Cured Preceramic Material [Show Task]
  - 354 Task-Inflatable Spacecraft Using Rigidization On CommandTechnology [Show Task]
  - 380 Task-Inflatable Solar Array Flight Test [Show Task]
  - 412 Task-Inflatable Structure for Mars Trans Hab [Show Task]
  - 534 Task-Out-of-Autoclave Processing of High Performance Composites [Show Task]
  - 694 Task-INFLATABLE MODULE FOR LUNAR/MARS SURFACE FACILITIES [Show Task]
  - 1179 Task-Single Walled Carbon Nanotube Production [Show Task]
  - 1246 Task-NASGRO crack growth analysis model [Show Task]
  - 1264 Task-Single Walled Carbon Nanotube Production [Show Task]
  - 1283 Task-TransHab [Show Task]

Example of Traceability (HEDS)

NASA Technology Inventory — **Tuesday, April 13, 1999**

Funding Enterprise: HEDS **Benefits to Enterprise:** HEDS

UPN: 906-47-TR UPN Lookup **ID :** 1283 **Old FileMakerPro ID :** 1284

Tech Need: Additional habitation volume required for Space Station, and advanced concept needed for future human exploration.

Task Name: TransHab

POC: Donna Fender **Center:** JSC **Phone:** 281-483-9300 **Email:** donna.l.fender1@jsc.nasa.gov

Critical Investment Area: Self-Sustaining Human Support	**Aero Program Element:**
Discipline Areas: Systems Engineering;Structures/Materials	**Space Science Key Capabilities:**

Objective, Description, Benefit:
The objective of the TransHab project is to derive a design concept for a Habitation Module that can serve to demonstrate some key technologies for missions beyond low earth orbit, while at the same time serving as a viable habitation module for the International Space Station (ISS). The TransHab is a space inflatable habitation module approximately 40' long by 27' in diameter. The hybrid structure incorporates an inflatable shell and a central hard structural core which combines the packaging and mass efficiencies of an inflatable structure and the advantages of hard structure habitat designs. The shell is composed of four types of layers: the internal bladder, the structural restraint layer, the micrometeroid/orbital debris shield, and the thermal protection blanket. The structural core is comprised of longerons with a bulkhead and tunnel at each end. The TransHab has three levels of living space. The module contains six crew quarters within the second level of the central core structure. The crew quarters are also surrounded by a water jacket for radiation protection during solar particle events. The ISS TransHab is scheduled to launch January 2004 as the space station habitation module. Major Objectives for FY98 are: - Proving basic structural feasibility on a large scale - Completing development of Micrometeoroid/Orbital Debris shield concept - Prove shell inflation (including structural restraint and MM/OD shield) under vacuum conditions

SOA with Metrics,Justification:
Small experimental inflatables have been built (~6' diameter, maximum), but none on this large of a scale. None as ever been built which interfaces to a central core structure. Inflatable habitation modules will enable lighter weight, more economical space vehicles for future human exploration needs.

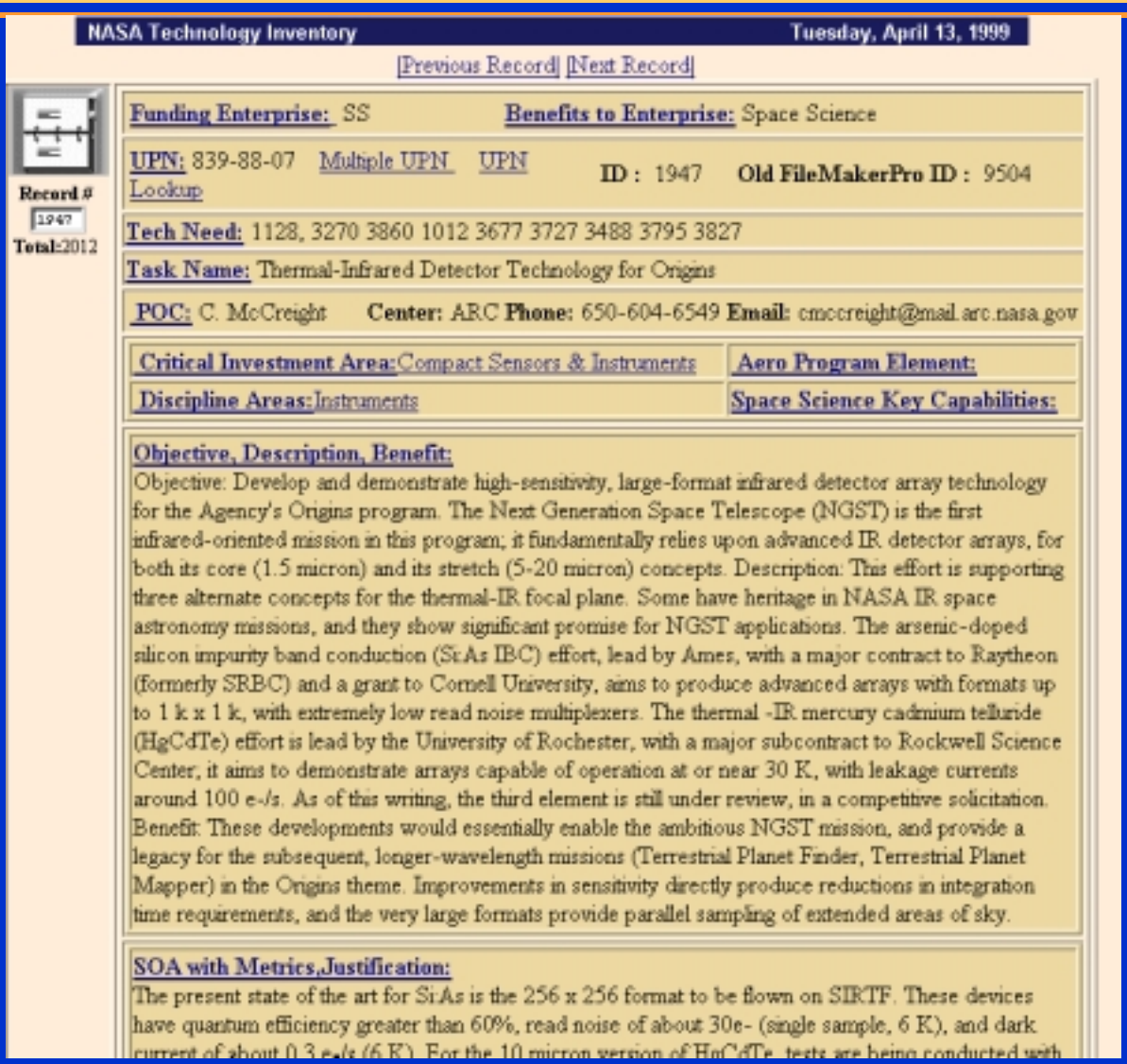
Example of Traceability (SS)

NASA Technology Inventory — Tuesday, April 13, 1999

- 4.Enterprise-Space Science::
  - 40.Mission Area- Solve mysteries of the Universe ::
    - 402.Challenge-Measure how chemical compounds evolve in interstellar clouds.
  - 40.Mission Area- Solve mysteries of the Universe ::
    - 403.Challenge-Measure how energy and matter exchange between stars and interstellar gas.
  - 40.Mission Area- Solve mysteries of the Universe ::
    - 404.Challenge-Characterize protostars and debris disks and trace young stars deep in their dustenshrouded stellar nurseries.
  - 40.Mission Area- Solve mysteries of the Universe ::
    - 409.Challenge-Characterize galaxy formation and evolution (early supernova and globular clusters).

- 4005.Concept-Filled aperture space telescope (4 m telescope, visible to near IR, -50 marcsec
  - 19 Task-Applications of Polymeric Thin Films [Show Task]
  - 147 Task-Structural Design, Analysis, Test, and Verification (DATV) - Code AE [Show Task]
  - 647 Task-Sol-Gel Coatings for Mirror Surfaces [Show Task]
  - 783 Task-LIGHTWEIGHT CARBON FILTER COMPOSITE MIRROR FABRICATION USING ADVANCED CORE TECHNOLOGY [Show Task]
  - 1420 Task-Antenna Systems [Show Task]
  - 1422 Task-Solid State Electronics [Show Task]
  - 1438 Task-Communications Systems - collect propagation data, and produce propagation effects prediction models [Show Task]
  - 1439 Task-Mobile Communications: Global star Land-Mobile Communications Expt [Show Task]
  - 1460 Task-Refined power system environmental design codes [Show Task]
  - 1463 Task-Electro-Physics Technology: Thermal Control Surfaces and Coatings [Show Task]
  - 1470 Task-Deployable Optical Benches and Booms [Show Task]
  - 1471 Task-Vibration Control [Show Task]
  - 1474 Task-Ground Testbeds - Interferometry [Show Task]
  - 1484 Task-Pathfinder Planetary Surface Rover [Show Task]
  - 1507 Task-Far-IR and Readout Technologies for Origins [Show Task]
  - 1539 Task-Low CTE Structural Components [Show Task]
  - 1541 Task-Precision Deployable Reflectors [Show Task]

Example of Traceability (SS)



NASA Technology Inventory — Tuesday, April 13, 1999

[Previous Record] [Next Record]

Record # 1947 Total:2012

Funding Enterprise: SS **Benefits to Enterprise:** Space Science

UPN: 839-88-07 Multiple UPN UPN Lookup **ID :** 1947 **Old FileMakerPro ID :** 9504

Tech Need: 1128, 3270 3860 1012 3677 3727 3488 3795 3827

Task Name: Thermal-Infrared Detector Technology for Origins

POC: C. McCreight **Center:** ARC **Phone:** 650-604-6549 **Email:** cmccreight@mail.arc.nasa.gov

Critical Investment Area: Compact Sensors & Instruments	**Aero Program Element:**
Discipline Areas: Instruments	**Space Science Key Capabilities:**

Objective, Description, Benefit:

Objective: Develop and demonstrate high-sensitivity, large-format infrared detector array technology for the Agency's Origins program. The Next Generation Space Telescope (NGST) is the first infrared-oriented mission in this program; it fundamentally relies upon advanced IR detector arrays, for both its core (1.5 micron) and its stretch (5-20 micron) concepts. Description: This effort is supporting three alternate concepts for the thermal-IR focal plane. Some have heritage in NASA IR space astronomy missions, and they show significant promise for NGST applications. The arsenic-doped silicon impurity band conduction (Si:As IBC) effort, lead by Ames, with a major contract to Raytheon (formerly SBRC) and a grant to Cornell University, aims to produce advanced arrays with formats up to 1 k x 1 k, with extremely low read noise multiplexers. The thermal -IR mercury cadmium telluride (HgCdTe) effort is lead by the University of Rochester, with a major subcontract to Rockwell Science Center, it aims to demonstrate arrays capable of operation at or near 30 K, with leakage currents around 100 e-/s. As of this writing, the third element is still under review, in a competitive solicitation. Benefit: These developments would essentially enable the ambitious NGST mission, and provide a legacy for the subsequent, longer-wavelength missions (Terrestrial Planet Finder, Terrestrial Planet Mapper) in the Origins theme. Improvements in sensitivity directly produce reductions in integration time requirements, and the very large formats provide parallel sampling of extended areas of sky.

SOA with Metrics,Justification:

The present state of the art for Si:As is the 256 x 256 format to be flown on SIRTF. These devices have quantum efficiency greater than 60%, read noise of about 30e- (single sample, 6 K), and dark current of about 0.3 e-/s (6 K). For the 10 micron version of HgCdTe, tests are being conducted with